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CATALOG

OF

COMPUTER TIME-SHARING PROGRAMS
RELEVANT TO OPERATIONS RESEARCH
(MANAGEMENT SCIENCE)

OPERATIONS RESEARCH BRANCH
OPERATIONS IMPROVEMENT DIVISION

May 1969

by Irwin T. Goodman

TACOM

MANAGEMENT AND DATA SYSTEMS DIRECTORATE

U.S. ARMY TANK AUTOMOTIVE COMMAND Warren, Michigan

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ABSTRACT

A catalog of USATACOM and Philco-Ford Computer Time-Sharing Programs relevant to Operations Research and Management Science and indexed to facilitate finding programs with particular problem solving characteristics has been compiled. The purpose of the catalog is to encourage and facilitate the use of the computer time-sharing terminal for solution of Operations Research and Management Science types of problems.

I. Introduction

The purpose of this document is to provide a visible listing of all USATACOM and Philco-Ford Computer Time-Sharing Programs currently available that are considered relevant to the conduct of Operations Research and Management Science. The programs have been indexed by a classification system outlined on the following page to facilitate finding computer time-sharing programs with particular problem solving characteristics. Also, the USATACOM and the Philco-Ford Programs were presented in separate sections to facilitate up-dating.

It is hoped this catalog will assist in the effective utilization of the computer time-sharing terminals at USATACOM for Operations Research and Management Science activities.

II. Classification System

1. Curve Fitting
2. Demonstrations, Models, and Simulation
3. Mathematical/Logical
4. Optimization Methods
5. Plotting
6. Preparation/Reduction of Data
7. Statistical

III. USATACOM Computer Time - Sharing Programs

1. Curve Fitting

Name	Description	Language
LSQFIT	Fits a function of two variables: $Z = \sum_{I=1}^{M} \sum_{J=1}^{N} A_{IJ} X^{I-1} Y^{J-1}$ to a set of data points by a least squares method. The function degenerates to a polynomial: $Z = \sum_{I=1}^{\cdot} A_{I} X^{I-1}$ for one variable. Up to 100 data points may be entered. T. Lassila/AMSTA-RS/X20173	FORTRAN

III. USATACOM Computer Time - Sharing Programs (cont'd)

2. Demonstrations, Models, and Simulation

Name	Description	Language
VLBLT	Determines and plots values of availability versus various ages. J. Fleck/AMSTA-QB/X2941	FORTRAN
DK1	A program to determine average cost of vehicles and production rate in yearly increments up to 10 years, with a known cost of first unit, total number of units to be produced, and number of years of production. D. Kasch/AMCPM-MCV/X20241	FORTRAN
DK2	A program to determine average cost and uni cost of vehicle at various production increments using standard learning curve. D. Kasch/AMCPM-MCV/X20241	FORTRAN
FIN-JT	Computes mortgage payments, interest, payment on principal, and total payment. Prints out payment number, year, month, interest payment on principal, total payment, balance, yearly totals of interest, and total interest for mortgage. The program will compute for either a fixed total payment, or for a fixed payment on principal. It also allows for a fixed additional payment on principal. T. Thero/AMSTA-REN/X26106	FORTRAN
LRNCUR	Performs learning curve computations. Provides results to a sensitivity analysis regarding the learning curve slope parameter. I. Goodman/AMSTA-SOR/X34246	BASIC

III. USATACOM Computer Time - Sharing Programs (cont'd)

Name	Description	Language
MARK1	Markov transition matrix MODEL for solution of random walk problems. Developed to analyze requisitioning system. Also can be applied to such diverse problems as charge accounts and tank battles. I. Goodman/AMSTA-SOR/X34246	FORTRAN
NEWR	A program which calculates reliability parameter of varied vehicle components. From these it computes component reliabilities and vehicle reliability in increments of age and mission. J. Fleck/AMSTA-QB/X2941	FORTRAN
SIMRLC	Analyses a network representation of a requisitioning system having nodes with probabilities assigned for taking one branch or another. M. Spinelli/ I. Goodman/AMSTA-SOR/X34246	FORTRAN
Supply Control Study	Performs calculations required by AR 710-45 to complete DA Form 1794 (15 April 1968) (currently batch processing mode only) I. Wollam/AMSTA-US/X22173	FORTRAN
WBLCRV	Based on the theory of median ranks and suspended items, this program plots failure points versus failure rate, scaled to Weibul paper. J. Fleck/AMSTA-QB/X2941	FORTRAN
DRBLT	A program for determining and plotting durability values versus various ages. J. Fleck/AMSTA-QB/X2941	FORTRAN

III. USATACOM Computer Time - Sharing Programs (cont'd)

3. Mathematical/Logical

Name	Description	Language
GELGUS	This program is one from the IBM Scientific Subroutine package. It solves a set of simultaneous linear algebraic equations by the Gauss elimination method. The size of the set of equaltions is limited only by computer storage space. J. Lassila/AMSTA-US/X20179	FORTRAN
INTERP	A subroutine to do linear interpolation. J. Wollam/AMSTA-US/X22173	FORTRAN
LISTOL	A subroutine taken directly from IBM's scientific subroutine package-version II. This subroutine inverts a matrix and returns the inverted matrix and value of the determinant of the original matrix to a main program. User must write a main program and call subroutine MINV. P. Haley/AMSTA-US/X29269	FORTRAN
MATX8	Accomplishes matrix multiplication routine. Procedure used to determine if a negative cycle exists and shortest paths in network/ graph theory problems in support of transportation/ assignment algorithms. I. Goodman/AMSTA-SOR/X30206	BASIC
RKG	This is an integration subroutine. It uses a fourth-order Runge Kutta Gill method and a constant step size. R. Hoogterp/AMSTA-US/X22173	FORTRAN

III. USATACOM Computer Time - Sharing Program (Cont'd)

4. Optimization Methods

Name	Description	Language
SEQALG	This program prescribes an optimum sequence for scheduling n jobs on one machine by minimizing the number of late jobs. The input is the processing time and due-date time for each job. The program is based on an algorithm developed by J.M. Moore, U of M, in his recently published PHD thesis. T. Goodman/AMSTA-SOR/X34246	BASIC

5. Plotting

Name	Description	Language
CALLOG	A program which draws a semi-log graph from data stored in a permanent file. It plots Y values on log scale and X values on linear scale. It has the option of not drawing axis, if desired. J. Wollam/AMSTA-US/X22173	FORTRAN
CALPLT	A program to produce linear plot on Calcomp plotter of any number of points. J. Wollam/AMSTA-US/X22173	FORTRAN
DUMMY	A plot program to be used on teletype. The teletype plots output of up to 1000 points. First quadrant plotting only. No axis labeling in program. P. Haley/AMSTA-US/X29269	FORTRAN
FLPCHT	A calcomp program to draw letters, words, and sentences on the calcomp plotter. J. Wollam/AMSTA-US/X22173	FORTRAN
GENCRV	A fortran program which is a subroutine for plotting points. J. Fleck/AMSTA-CB/X2941	FORTRAN

III. USATACOM Computer Time - Sharing Program (cont'd)

Name	Description	Language
LOGAX$	A subroutine to plot and label a logarithmic axis. J. Wollam AMSTA-US/X22173	FORTRAN
LOGRD$	A program which produces parallel lines with either logarithmic or linear spacing. J. Wollam/AMSTA-US/X22173	FORTRAN
PLOTI	A program which produces punched tape with a special format for plotting discrete points on EAI digital plotter. P. Manning/AMSTA-GF/X28216	FORTRAN
PLOT2	A program which produces punched tape for plotting continuous graphs on EAI digital plotter. P. Manning/AMSTA-GF/X28216	FORTRAN
PPLOT	A subroutine to produce a character plot on the teletype carriage. J. Wollam/AMSTA-US/X22173	FORTRAN

6. Preparation/Reduction of Data

Name	Description	Language
DATC01	Prepares data from DATBAX (data file X) in format for processing DESTAT. Selects by specification certain columns and/or rows of data from referenced data file X (DATBAX). M. Spinelli/ I. Goodman/AMSTA-SOR/X34246	FORTRAN
DATC02	Prepares data for DATBAX (data file X) in format for processing by ISTATM. Selects by specification certain columns and/or rows of data from referenced file X (DATBAX). M. Spinelli/ I. Goodman/AMSTA-SOR/X34246	FORTRAN

III. USATACOM Computer Time - Sharing Program (cont'd)

Name	Description	Language
DATES1	This program prepares data for input to LINPRG for linear programming solution to an assignment problem or transportation problem. Also, for linear programming solution to allocation problem by minor modification of output from transportation version of DATES1. I. Goodman/AMSTA-SOR/X34246	FORTRAN
DATES2	This program prepares data for input to LINPRG for li ear programming solution to a regression problem. I. Goodman/AMSTA-SOR/X34246	FORTRAN

7. Statistical

Name	Description	Language
ARTWED	An analysis of variance for a replicated two-way experimental design. C. Rose/AMSTA-BSD/X26133	
CONF	Calculates the 95% confidence band for the mean values of Y for each X. A. Newell/AMSTA-US/X22173	FORTRAN
COVAST	Computes percent match, mismatch, AND "cannot find" in support of computer file validity studies. I. Goodman/AMSTA-SOR/X34246	BASIC
MEDR	This program calculates the mean order number and median ranks for suspended test failure data. Up to 200 failure numbers are permitted. M. Archambault/AMSTA-US/X34221	BASIC
PRDICT	For a given set of data, the program computes frequency PDF and CDF for class intervals and then plots results. M. Spinelli/ I. Goodman/AMSTA-SOR/X34246	FORTRAN

III. USATACOM Computer Time - Sharing Program (cont'd)

Name	Description	Language
RANDNU	Random number generator for the GE265. J. Wollam/AMSTA-US/X22173	
RANSAM	Computes required sample size N for various values of statistic being estimated at a relative error D in percent. I. Goodman/AMSTA-SOR/X34246	BASIC
RESEQ	This program re-orders numbers from smallest to largest and prints them out. A. Newell/AMSTA-US/X22173	FORTRAN
SAMSI	Allocates sample size N by use of random numbers among M sub samples. I. Goodman/AMSTA-SOR/X34246	BASIC
SAP4	A program which is a sensitivity analysis of proposed scoring systems. Various proposals are evaluated using five criteria, each of which is assigned a weighted value. The sensitivity of the total score to various weighted values can thus be determined. R. Marson/AMSTA-US/X22173	FORTRAN
SUSPGR	Performs non-parametric analysis of grouped data, failure and unfailed (suspended), based upon the Leonard Johnson technique. I. Goodman/AMSTA-SOR/X34246	BASIC

IV. Philco-Ford Computer Time - Sharing Programs

1. Curve Fitting

Name	Description	Language
CURFIT***	Fits 6 different curves by least squares method	BASIC
LINREG***	Performs multiple linear regression according to Efroymons algorithm	BASIC
MULFIT***	Multiple linear fit with transformations	BASIC
MULREG***	Multiple regression that will perform an analysis for one dependent variable, up to six independent variables. For instructions ...List MULTEX***	ALGOL
MULTRY***	Allows successive elimination of variables from a multiple regression analysis. For instructions...List MULTEX***	ALGOL
NICOLS***	Provides a cubic polynomial with variable coefficients to fit a given sequence of points. List NICIN*** for instructions.	FORTRAN
SIXCUR***	Linear regression. Fits six different curve types to bivariant data. For instructions... List SIXEXP***	ALGOL

2. Demonstrations, Models, and Simulation

Name	Description	Language
GUNNER***	Artillery Practice Program	BASIC

IV. Philco-Ford Computer Time - Sharing Programs (cont'd)

3. Mathematical/Logical

Name	Description	Language
FMATRX***	Performs matrix operations on up to a 20x20 matrix. Finds the inverse, adjoint, and determinant. List FMATEX*** for instructions.	FORTRAN
MATRIX***	Performs matrix multiplication for rectangular matrices having no more than 20 rows or col. For instructions...List MATEXP***	ALGOL
POLFIT***	Fits least-square polynomials to bivariate data, using an orthogonal polynomial method.	BASIC
SIMEQN***	Solves simultaneous linear equations.	BASIC
SIMEQU***	Computes the determinant of a matrix. List SIMEXP*** for instructions.	FORTRAN
TRUTAB***	Calculates the truth table for a logic equation and prints the true positions of the table. For instructions, run TRUINS*** (under BASIC system).	FORTRAN

4. Optimization Methods

Name	Description	Language
CPMONE***	Purifies a network and creates input for program CPMTWO***for instructions, list CPMINS***	BASIC
CPMTWO***	Provides various parameters relating to a critical path. List CPMINS***for instructions.	ALGOL
LINPRG***	Linear programming. For instructions...List LPINFO***	BASIC

IV. Philco-Ford Computer Time - Sharing Programs (cont'd)

Name	Description	Language
LINPRO***	Linear Programming. List LPINST*** for instructions.	BASIC
LPALGL***	ALGOL version of LINPRG***	ALGOL

5. Plotting

Name	Description	Language
CALPLO***	Calculates and/or plots values of a function of the variable T.	ALGOL
CALPLT***	Generalized Plotting Program	FORTRAN
PLOTER***	X, Y plot routine, inputs either equations or up to 400 data points.	BASIC
PLOTTO***	Plots up to six equations simultaneously.	BASIC
TWOPLO***	Simultaneous plot of two functions.	BASIC
XYPLOT***	Plots single valued functions of X, with X on the vertical axis.	BASIC

6. Preparation/Reduction of Data

7. Statistical

Name	Description	Language
BICONF***	Confidence limits for a population proportion using binomial distribution.	BASIC
BINDIS***	Calculates binomial probability distributions.	BASIC
BITEST***	Test of binomial proportion.	BASIC
COLINR***	Calculates confidence limits on simple linear regression. List STADES*** for instructions.	BASIC

IV. Philco-Ford Computer Time - Sharing Programs (cont'd)

Name	Description	Language
CONBIN***	Confidence limits on proportion using normal approximations.	BASIC
CONDIF***	Confidence limits on difference between two means.	BASIC
CONLIM***	Computes confidence limits for an unknown population mean.	BASIC
DESTAT***	Analyzes a set of observations on one variable. For instructions...List DESTEX***	ALGOL
DSKCAL***	Functions as a desk calculator. For instructions list DSKEXP***	FORTRAN
F-TEST***	Calculates value of F statistic for two sets of data.	BASIC
ISTAT1***	Interactive statistics write-up and sample runs. ISTAT2*** and ISTAT3*** must be saved under user number before attempting to run ISTAT1***. Run ISTATE*** for explanation.	FORTRAN
ISTATS***	Summary of ISTAT1*** Commands.	FORTRAN
ONEWAY***	One-way analysis of variance.	BASIC
PROTRE***	Computes mean, standard deviation, and skewness for the distribution of any function consisting of up to 9 distributions.	ALGOL
SEVPRO***	Applies a Chi-square test to several sample proportions.	BASIC
STATAN	Performs a statistical analysis on data for one variable. List STATEX*** for instructions.	BASIC
STNDEV***	Calculates sample mean, sample standard deviation and standard error of sample mean. (Replaces program MNSD***)	BASIC

IV. Philco-Ford Computer Time - Sharing Programs (cont'd)

Name	Description	Language
T-TEST***	Calculates value of T statistic for two sets of data.	BASIC
TWOWAY***	Performs an analysis of variance for 1-way or 2-way classification, with replication in each cell if present.	ALGOL
WEIBUL***	Weibul plotting calculations for up to 50 data points.	BASIC
YATES1***	Performs an analysis of variance for a 2/N design using Yates algorithm.	BASIC
YBULKS***	Weibull plotting calculations for up to 100 data points.	BASIC

V. References

Philco-Ford Computer Time Sharing CATLOG***, 2 April 69.

Archambault, Mary and Newell, Annie G., Listing of Time Sharing Computer Programs, USATACOM Mobility Systems Laboratory, Scientific Computer Division, 1 October 68.

Archambault, Mary and Newell, Annie G., Listing of Time Sharing Computer Programs, USATACOM Mobility Systems Laboratory, Scientific Computer Division, 1 April 69.

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13. ABSTRACT

A catalog of USATACOM and Philco-Ford Computer Time-Sharing Programs relevant to Operations Research and Management Science and indexed to facilitate finding programs with particular problem solving characteristics has been compiled. The purpose of the catalog is to encourage and facilitate the use of the computer time-sharing terminal for solution of Operations Research and Management Science types of problems.

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